DOCUMENT RESUME

ED 432 250 IR 019 620

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TITLE New Meets New: Fitting Technology to an Inquiry-Based Teacher Education Program.
PUB DATE 1999-00-00
NOTE 7p.; In: SITE 99: Society for Information Technology & Teacher Education International Conference (10th, San Antonio, TX, February 28-March 4, 1999); see IR 019 584.
PUB TYPE Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Computer Assisted Instruction; Computer Literacy; Curriculum Development; Foreign Countries; Higher Education; Instructional Development; Masters Programs; Needs Assessment; Student Teachers; *Teacher Certification; *Teacher Education
IDENTIFIERS *Technology Integration; University of Calgary (Canada)

ABSTRACT

The method by which student teachers at the University of Calgary are prepared to meet technology requirements for teacher certification has been made obsolete by the introduction of a new inquiry-based teacher education program. Combined with a new school curriculum, which requires the seamless integration of technology into core subject areas, this has prompted the need to rethink the technology aspect of the teacher education program. A needs assessment based on the new Alberta curriculum was conducted to generate a technology profile of student teachers entering this new two-year Master of Teaching program, and to facilitate selecting appropriate means to integrate technology within it. In contrast to the previous teacher education program that concentrated on foundational technology knowledge and productivity skills with computers, it appears that efforts in the Master of Teaching program should be concentrated on more sophisticated technical skills and on the integration, communication, decision making, and problem solving aspects of educational technology. (Author/AEF)

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New Meets New: Fitting Technology To An Inquiry-Based Teacher Education Program

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Abstract: The method by which student teachers at the University of Calgary are prepared to meet technology requirements for teacher certification has been made obsolete by the introduction of a new inquiry-based teacher education program. Combined with a new school curriculum, which requires the seamless integration of technology into core subject areas, this has prompted the need to rethink the technology aspect of the teacher education program. A needs assessment based on the new Alberta curriculum was conducted to generate a technology profile of student teachers entering the new program, and to facilitate selecting appropriate means to integrate technology within it.

Introduction

In days of yore the University of Calgary had a very "traditional" teacher education program. It accepted students into a four-year Bachelor of Education program, a shorter B.Ed. after-degree program, and a variety of combined degree programs. Students saw themselves as *students*, and they were treated like *students*; they attended classes on teaching methods, psychometrics, communication, special education, and so on. Common to their experiences was the belief that what they did at the University bore no useful relationship to what happened in the classroom, and they couldn't wait for their practicum experiences when they were able to do *real* teaching in *real* schools. Their academic program was intended to prepare them for teacher certification in the Province of Alberta and this included meeting the technology requirements for teacher certification. Consequently among the courses in their program was EDTS 325: Introduction to Computers in Education—two hours a week of lecture supported by three hours a week in the lab, plus extra personal time required to complete lab assignments and projects. Students who passed through the program gained at least a minimally acceptable level of competence with productivity software, multimedia, hypermedia, communications, and computer assisted instruction, and they were required to muse about these in educational contexts. Those who were intrigued by technology in education were afforded the opportunity to obtain a minor in computer applications by taking additional courses.

This course-based undergraduate program is dead, and from its ashes has arisen the Master of Teaching program. After completing at least one previous degree with a specialization in an area relevant to a school classroom, those wishing to become teachers now enroll in the two-year Master of Teaching (MT) Program offered at the University of Calgary. MT students are assigned to a Professional Seminar, a Case Tutorial, a Field Seminar, a school, and a community/workplace teaching site. They are treated as professionals in the making in a program which describes itself as *learner- focused*, *inquiry-based*, and *field-oriented*. Within five days of beginning their program, students spend a week immersed in their school settings, and for the remainder of their first year they divide their time almost equally between school and campus. The exception is a period of five weeks in which their field experience shifts to some educational setting other than a traditional school: zoo, art gallery, museum, prison, day care, special needs facility, social agency, human resources department, and so on. The academic portion of their program is carried in a series of cases with which they must wrestle weekly. No one student can possibly research all of the issues embedded in the cases, and they soon learn that they are heavily dependent upon each other to gain maximum

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benefit from the program. The idea of mutual inter-dependency has been facilitated by removing the private and competitive elements associated with grades, and substituting a credit/fail system that is documented by a series of narrative reports. Those who do not contribute to the common good rapidly feel the heat of peer pressure to actively participate. Field Seminars provide opportunity for cross-fertilization from the breadth of experiences which students have in their various school and community/workplace settings, and to pursue issues arising from their practical experiences. Finally, Professional Seminar provides a forum in which additional lenses may be brought to bear on the integration of theory and practice, and also provide a container to house the independent studies and biographies of learning required of each student. The second year of the MT program is dominated in the first semester by a sustained field experience in a school, and in the second semester by a field-based research project.

A considerable amount of research and careful thought went into making this radical change in teacher education. What was not considered carefully enough in conceptualizing this new program was how to address the needs of students to gain the technology competencies required for certification. That task is now in the hands of the authors of this paper—and there are some constraints! Returning to the formalities of lecture and lab is not an option; the philosophy and spirit of the new program, *learner-focused, inquiry-based, field-oriented,* must be maintained.

New Meets New

The task of developing the technology component of the MT Program is further influenced by a change in the school curriculum within Alberta. The province has decreed that technology in the classroom will not be a discreet affair relegated to the computer lab, but will be integrated within the core school subjects. This new provincial curriculum is contained in a document, *Information and Communication Technology, Kindergarten to Grade 12: Interim Program of Studies* (Alberta Education, 1998), and is due for implementation in the schools beginning in September 1999. Best described as a requirement to teach technology across the curriculum, the new framework emphasizes (1) the seamless relationship between technology and the subject disciplines, (2) the process nature of technology itself, and (3) the co-existence of KSAs for technology alongside those for the subject areas. In large measure it also assumes a constructivist approach to teaching. From the point of view of teacher education, it is not only desirable that students become familiar with the content of the new curriculum; it is also desirable to achieve some methodological consistency between how technology is incorporated within the MT Program and what will be required by experienced teachers within schools to implement the new curriculum.

Finding the means of achieving these goals is presently the responsibility of the authors. We will pause here to include a very brief confession to the effect that our first efforts at addressing the competencies bombed. We organized some drop-in introductory workshops—practically no one came. We commandeered one Professional Seminar time slot, and organized an introduction to electronic information resources available to the campus—half the students loved it, the other half were bored to tears. In the wake of these experiences, we paused briefly, and began to examine our own assumptions. We came to the following conclusions:

1. We only thought we knew our target audience. We were really working from a student profile of students in our old four-year, first-degree B.Ed. program, not a program in which every student has already completed at least one degree.

1

2. It is inappropriate to assume that repackaging the technology content from the previous program to a new format is all that is required.

2

3. We need to rethink the implications of skill development within a constructivist framework.

Needs Assessment Methodology

With our assumptions shattered, we went back to basics and conducted the needs assessment we should have considered in the first place. We settled upon conducting a survey as the most appropriate means of (1) gathering baseline information from Master of Teaching students about their educational technology knowledge and skills, and (2) evaluating their current teaching readiness against the backdrop of the new Alberta Education technology learner objectives. Since we found no standardized survey instrument that would meet our needs, we distilled the required learning outcomes of the Alberta curriculum for grades 3 through 9 into a competency set, and then used this

competency set as the foundation upon which to construct a 66-item survey. The Needs Assessment Survey was organized into three subscales:

(a) Demographic (7 items).
(b) Prior computer experience (8 items).
(c) Alberta Education learner outcomes (51 items).

Demographic information was gathered for age, gender, faculty/department of previous degree, highest degree held, home access to computer, home access to Internet, and MT Program specialization. Items pertaining to prior computer experience were measured on a five point scale that was assumed to gather interval level data (i.e., 0 = None, 1 = A little, 2 = Fair, 3 = Substantial, 4 = Extensive). The eight items in this set sought information about degree of prior experience with word processing, electronic mail, browsing and searching the World Wide Web, accessing library resources using the Web, presentation software, Web page creation and editing, spreadsheets, and database creation. These were based upon core objectives of the compulsory education technology course in the previous program.

The items measuring self-assessment of readiness to teach the Alberta Education learner outcomes gathered ordinal level data using a four-point scale. The four points on this scale were distinguished between knowledge and skill, and between personal knowledge/skill and the ability to teach it: 1 = I cannot do this, 2 = I know about this, 3 = I can do this, 4 = I can teach this to students. The 51 items represent 22.5% of the 226 specific learner outcomes from three sections of the new curriculum: (a) 22 of 96 (23%) from *Foundational Operations, Knowledge and Concepts*, (b) 15 of 53 (28%) from *Processes for Productivity*, and (c) 14 of 77 (18%) from *Communication, Inquiry, Decision Making, Problem Solving* (Alberta Education, 1998). Because there was concern that the survey not be perceived as *long* by the respondents, an effort was made to select learner objectives that represented the overall curriculum but were not redundant with other objectives. The three categories of objectives from which we developed our survey appear in Table 1.

Foundational Operations, Knowledge and Concepts
F1. Students will demonstrate an understanding of the nature of technology.
F2. Students will understand the role of technology as it applies to self-work, and society.
F3. Students will demonstrate a moral and ethical approach to the use of technology.
F4. Students will become discerning consumers of mass media and electronic information.
F5. Students will practice the concepts of ergonomics and safety when using technology
F6. Students will demonstrate a basic understanding of the operating skills required in a variety of technologies.

Processes for Productivity
P1. Students will compose, revise and edit text.
P2. Students will organize and manipulate data.
P3. Students will communicate through multimedia.
P4. Students will integrate various applications.
P5. Students will navigate and create hyperlinked resources.
P6. Students will use communication technology to interact with others.

Communication, Inquiry, Decision Making, Problem Solving
C1. Students will access, use and communicate information from a variety of technologies.
C2. Students will seek alternative viewpoints, using information technologies.
C3. Students will critically assess information accessed through the use of a variety of technologies.
C4. Students will use organizational processes and tools to manage inquiry.
C5. Students will use technology to aid collaboration during inquiry.
C6. Students will use technology to investigate and/or solve problems.
C7. Students will use electronic techniques to construct personal knowledge and meaning.

Table 1: Alberta Education Technology Curriculum Categories and General Learner Outcomes

The survey instrument [On-line:] was developed for administration using the World Wide Web. Following pilot testing and revision, it was administered to all students attending Professional Seminar within a two-week time

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period during November 1998. According to a pre-arranged schedule, one of the authors met briefly with students in each Professional Seminar and explained the nature and purpose of the survey. It was explained to students that the data gathered could not be traced back either to them individually or to the professional seminar collectively. Each group of students then went to one of two computer labs in which each computer displayed the survey; they completed the survey, and returned to their seminars. Perhaps somewhat surprisingly, most students left the computer labs thanking the authors for the opportunity to participate. A significant byproduct of conducting the survey proved to be its value in heightening awareness among student teachers, and faculty members, of the nature of the new curriculum.

Results

From a potential pool of 383 first year students currently registered in the MT program, 281 completed the survey data, a response rate of 73.3%. Table 2 presents selected demographic data reported as percentages.

Gender:	Female	73%	Male	27%		
Age:	Under 25	40.2%	Age 25-30	43.4%	Over 30	16.4%
Computer at home:	Yes	83.6%	No	16.4%		
Internet at home:	Yes	63.3%	No	36.7%		
Highest degree:	Bachelor	86.4%	Bachelor (Hon)	9.9%	Masters 2.4%	Doctor 1%

Specializations:	Elementary	55.5%	Early Childhood	1.7%
	Secondary English	7.4%	Secondary Fine Arts	6.8%
	Secondary Mathematics	1.7%	Secondary Science	11.4%
	Secondary Social Studies	7.2%	Secondary French	1.1%
	Secondary Physical Education	7.2%		

Table 2: Demographic data reported as percentages of respondents

Participants have completed their prior degrees in a wide range of faculties and departments: Agriculture, Arts, Education, Engineering, Environmental Design, Fine Arts, General Studies, Humanities, Kinesiology, Management, Pharmacy, Science, Social Sciences, and Social Work. A descriptive summary of prior computer experience of the respondents is presented in Table 3.

Item	Mean	SD
Word Processing	2.84	0.95
Electronic Mail	2.24	1.19
WWW browsing and searching	2.05	1.15
Accessing Library Resources using the WWW	1.63	1.21
Spreadsheets	1.21	1.09
Database creation	0.60	0.96
Presentation Software	0.57	0.91
WWW page creation and editing	0.35	0.74

Table 3. Means and Standard Deviations of Participants' Prior Computer Experience

Overall, participants report the most expertise with word processing, electronic mail and WWW browsing and searching. However, a percentage of students also report having "none" or "a little" word processing experience (9.5%), electronic mail experience (25.5%), and WWW browsing and searching experience (33.3%). Skill areas potentially in need of development support (i.e., "none" to "a little" expertise) for a majority of students appear to be accessing library resources using the WWW (48.3%), spreadsheets (64.7%), database creation (82.5%), presentation software (82.5%), and WWW page creation and editing (92.4%).

One of the authors' suspicions embarking on the needs assessment was that the technology profile of students in the new teacher education program was different from that of students in the previous program. A study by Ott (1996) conducted in Fall 1995 gathered data about expertise levels of students in the compulsory technology course at the

beginning of the semester. Table 4 presents a comparison of the present Fall 1998 survey findings (n=281) with results obtained from students in the previous program (n=101). Differences between the two populations are clear. The 1995 sample included a majority of students who were completing their first degree (79.2%), many of whom were in their first or second year of university (54.5%), and two-thirds of whom had access to a computer at home. A larger percentage of MT students have access to a computer at home (83.6%), and have some prior computer experience with word processing, electronic mail, and spreadsheets.

Item	1995	1998
Access to a computer at home	67.3	83.6
Hold a previous degree	20.8	100.
Some Prior computer experience:		
Word Processing	89.0	99
Electronic mail	32.7	89
Spreadsheets	51.5	69

Table 4. Comparative Percentages of Respondents for 1995 and 1998 Surveys

Teaching Readiness

At the time of writing we are still examining the data gathered regarding teaching readiness. Already, however, some interesting trends seem to be emerging that can inform programmatic decision making. There is, for example, a hierarchical relationship among the three categories of learning outcomes specified by Alberta Education: (1) *Foundational Operations, Knowledge and Concepts*, (2) *Processes for Productivity*, and (3) *Communication, Inquiry, Decision Making, Problem Solving*. The content of each category is supportive of, and in some measure prerequisite to, the category that follows. Interestingly, the level of comfort of the respondents decreased with each successive category. Not a single respondent selected *I cannot do this* for one of the 22 items in *Foundational Operations, Knowledge and Concepts*. As a matter of fact, for 12 of the 22 *Foundational* items, over 50% of the respondents indicated that they were capable of teaching students. They appear to judge themselves considerably less ready to teach items found in the *Productivity* category, and least ready to teach items found in the *Communication, Inquiry, Decision Making, Problem Solving* category. Table 5 illustrates this by providing an example in which the progressive relationship among learning outcomes is easily recognizable.

	1	2	3	4
F4. Students will become discerning consumers of mass media and electronic information				
Analyze techniques used by the media to elicit particular responses from an audience.	0	16.3	28.1	55.5
P4. Students will integrate various applications.				
Integrate visual and audio information to create a message targeted for a specific audience.	51.6	29.5	10.3	8.5
C7. Students will use electronic techniques to construct personal knowledge and meaning				
Use a variety of technologies to organize and synthesize information, e.g., construct an electronic portfolio.	64	22.7	7.8	5.3

Table 5: Example of decreasing confidence in ability to teach with increasing sophistication of Alberta Education learning outcomes.

This trend has added significance given that those who are currently developing the assessment framework for the new technology curriculum are concentrating their evaluation efforts on the third category of learner outcomes on the grounds that both Foundations and Productivity "feed into" or support these higher level goals.

Recommendations

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In contrast to the previous teacher education program that concentrated on *foundational* technology knowledge and *productivity* skills with computers, it would appear that efforts in the MT program should be concentrated on more sophisticated technical skills and on the integration, communication, decision making, and problem solving aspects of educational technology. Our challenge now is to address these needs within the modus operandi of the new MT program -- mounting additional courses is not an option.

We are currently considering a number of creative and innovative approaches to increasing the critical mass of technology knowledge and skills among our MT students. One approach is to identify ways in which we can integrate the new technology curriculum within the new MT Program framework. Thus, the authors are experimenting with ways to integrate authentic technology requirements in the Professional Seminar. With the goal of creating a collaborative on-line community, students will learn how to publish and exchange the results of their coursework and investigations using individual World Wide Web homepages. In addition to creating a web-based, electronic portfolio of their own work, students will work collaboratively to research, design, and produce web-based investigations for school age students using a constructivist framework. As one of our guides, we will use McKenzie's (1998) approach to the development of *webquest* projects that promote engaged learning, sustained questioning, higher level thinking, problem solving and fresh thought.

A second approach we are considering is a modified STARS (1998) program, originally developed by Wake Forest University, which would create opportunities for students in the MT program who have an interest in specializing in technology. Student Technology Advisors at Wake Forest are skilled with educational technology, receive specialized training, and provide paid professional development and support to faculty members. Our survey revealed that a small group of our students, between 10% to 15% of respondents, are confident in their readiness to teach all of the learner objectives we sampled. Thus, we have a specialized group of students who could offer professional development opportunities for their peers. A modified STARS program has the potential to be mutually beneficial for MT students who want to further develop their specialization, and for MT students who need professional development in technology integration.

A framework we are also considering has been developed for the professional development of inservice teachers to integrate technology across the curriculum (Alberta Education, in press). This framework, which acknowledges the constructivist perspective of the new curriculum, identifiesÊ*maintenance* and *catalytic* roles in institutional support for professional development and acknowledges the generation of personal knowledge as well as skill-building. It may well be that employing a model of professional development would offer a better guide than the customary content-delivery curricular model of higher education. Adopting this framework may be a significant step not only for integrating technology into the Master of Teaching program but also in beginning toÊaddress the discontinuity between preservice and inservice teacher education.

References

Alberta Education. (1998). Information and communication technology, kindergarten to grade 12: An interim program of studies. Curriculum Standards Branch, June 1998. [On-line]. Available:

Alberta Education (In Press). Professional Development for Teaching Technology Across the Curriculum. Edmonton, AB.

McKenzie, J. (1998). Grazing the Net: Raising a Generation of Free Range Students. Phi Delta Kappan. [On-line]. Available:

Ott, S. M. (1996). Preservice teachers and computers: A survey of attitudes and experiences. Unpublished Masters Thesis, Department of Educational Psychology, University of Calgary, 1996.

STARS. (1998). STARS Program of Wake Forest University. [On-line]. Available: